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Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	325772009100	*Total Pages*	76
First Named Inventor or Application Identifier			
Kenji MASAKI			
Express Mail Label No.	EJ004417565US		

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Blanche H. Cook

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: **Assistant Commissioner for Patents**
Box Patent Application
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1. [X] Fee Transmittal Form
(Submit an original, and a duplicate for fee processing)
2. [X] Specification [*Total Pages* 22]
(preferred arrangement set forth below)
- Descriptive title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings *(if filed)*
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. [X] Drawing(s) *(35 USC 113)* [*Total Sheets* 9]
4. [X] Oath or Declaration [*Total Pages* 3]
a. [X] Newly executed (original)
b. [ ] Copy from a prior application (37 CFR 1.63(d))
(for continuation/divisional with Box 17 completed)
[Note Box 5 below]
i. [ ] DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b)

5. [X] Incorporation By Reference *(useable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.

6. [ ] Microfiche Computer Program *(Appendix)*
7. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
a. [ ] Computer Readable Copy
b. [ ] Paper Copy (identical to computer copy)
c. [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [X] Assignment Papers (cover sheet & document(s))
9. [ ] 37 CFR 3.73(b) Statement [ ] Power of Attorney
(when there is an assignee)
10. [ ] English Translation Document *(if applicable)*
11. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
12. [ ] Preliminary Amendment
13. [X] Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
14. [ ] Small Entity Statement(s) [ ] Statement filed in prior application, Status still proper and desired
15. [X] Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. [ ] .....

17. If a CONTINUING APPLICATION, *check appropriate box and supply the requisite information:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No:

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dc-154618

☒ If a paper is untimely filed in the above-referenced application by applicant or his/her representative, the Assistant Commissioner is hereby petitioned under 37 C.F.R. § 1.136(a) for the minimum extension of time required to make said paper timely. In the event a petition for extension of time is made under the provisions of this paragraph, the Assistant Commissioner is hereby requested to charge any fee required under 37 C.F.R. § 1.17(a)-(d) to **Deposit Account No. 03-1952**. However, the Assistant Commissioner is **NOT** authorized to charge the cost of the issue fee to the Deposit Account.

The filing fee has been calculated as follows:

FOR	NUMBER FILED	NUMBER EXTRA	RATE	CALCULATIONS
TOTAL CLAIMS	20 - 20 =	0	x $18.00	$
INDEPENDENT CLAIMS	4 - 3 =	1	x $78.00	$78.00
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $260.00	$
			BASIC FEE	$760.00
		TOTAL OF ABOVE CALCULATIONS =		$838.00
Reduction by 1/2 for filing by small entity (Note 37 C.F.R. §§ 1.9, 1.27, 1.28). If applicable, verified statement must be attached.				$
Assignment Recording Fee (if enclosed)				$40.00
			TOTAL =	$878.00

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Applicant(s) hereby petitions for any required relief including extensions of time and authorizes the Assistant Commissioner to charge the cost of such petitions and/or other fees or to credit any overpayment to **Deposit Account No. 03-1952** referencing docket no. 325772009100. A duplicate copy of this transmittal is enclosed, for that purpose.

Dated: April 7, 1999

Respectfully submitted,

By: _____

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TITLE OF THE INVENTION

DIGITAL IMAGE PROCESSING APPARATUS

This application is based on application No. H10-115868 filed in Japan, the contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the field of digital image processing.

2. Description of the Related Arts

Digital image processing techniques have major features of easy image editing and modifications.

Figs. 16, 17, and 18 are conceptual diagrams showing the configuration of such prior art image automatic correction software.

Usually an editor (operator) performs various operations on an original image with the aid of such software, thereby obtaining a desired image in a trial and error fashion.

In such a process, an image at each step in which an original image is subjected to different processing as shown in Fig. 17 is saved, and if a desired image is not obtained by processing in one way, processing is often performed again from the beginning or performed on an intermediate image in a different way.

In the process of the operations, carefully making records of an original image pertaining to image data created at each step, information about processing on the images, and other information may avoid confusion, but an editor often concentrates attention to processing itself and neglects such recording, so that data at intermediate steps is disorderly accumulated, with the result that the intermediate data cannot be reused. For this reason, operations that have been heretofore performed often become meaningless.

In the case where a plurality of images are processed at a time as in automatic image correction software as shown in Fig. 18, the same problem as described above occurs since it cannot be determined what processing the program performed on each image.

Furthermore, also when image data is passed to different editors, the editors will perform similar

operations because the history of the image data is not always clear.

Although an image produced as a result of image processing may be intuitively different from an original image thereof, it cannot be practically determined visually what processing has been performed to produce the image, what the original image was like, which of two pieces of data, if any, is the original image, and the like.

Presently, numerous file formats of images are proposed and some of them permit predetermined information to be written in advance in a predetermined area (tag) of a file. However, some file formats do not have such an area or have no area corresponding to information to be written; these formats are inconvenient to use because desired information cannot be recorded.

The United States Patent No. 5,530,759 by Gordon et al discloses a system for placing a visible "watermark" on a digital image, wherein an image of the watermark is combined with the digital image.

The pixels of the watermark image are examined, and for each pixel whose value is not a specified "transparent" value, the corresponding pixel of the

original image is modified by changing its brightness but its chromaticities. This results in a visible mark which allows the contents of image to be viewed clearly, but which discourages unauthorized use of the image.

The important matter of this patent is that the contents of image are visible and thereby the unauthorized use of the image is prevented.

SUMMARY OF THE INVENTION

An object of this invention, which is different from that of the Gordon's patent, is to solve the problem described above by arresting the recognition of written information by users, that is, reducing to a minimum a visible influence on images, and nevertheless by making it possible to determine what processing was performed on image data or when the processing was performed, from information of the image data itself.

In this invention, bits for describing information different from information of processed image data, obtained by image processing on original image data, are placed respectively in specific bit positions of pixel data at predetermined positions of the processed image. The specific bit positions are placed dispersively over the image surface and thereby

information different from image information can be embedded in the image information without substantially influencing the quality of image.

According to this invention, the history of image processing on digital images can be saved in image data itself.

In the case where a plurality of images are processed at a time as in automatic image correction software, it cannot be determined with the prior art what processing the program performed on each piece of image data. However, according to this invention, information about the processing can be saved as a record.

Since the history of processing is recorded in image data itself according to this invention, an original image can be restored by reversing the processing.

Even if there are a number of similar images, according to this invention, the oldest image or an original image can be easily recognized from the history of processing.

According to this invention, since any information can be recorded, a picture date and names can be recorded and saved so that they are hidden from

view.

According to this invention, since information can also be cryptographically recorded, although processing is heavily loaded, secret information can be thereby recorded.

According to this invention, since information is embedded in image data itself, different types of information can be recorded regardless of the formats of image files.

Other objects and advantages besides those discussed above shall be apparent to those skilled in the art from the description of a preferred embodiment of the invention which follows. In the description, reference is made to accompanying drawings, which form a part thereof, and which illustrate an example of the invention. Such example, however, is not exhaustive of various embodiments of the invention, and therefore reference is made to the claims which follow the description for determining the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate embodiments of the invention

and together with the description, serve to explain the principles of the invention.

Fig. 1 is a flowchart for explaining the outline of this invention.

Fig. 2 is a subroutine flowchart showing the contents of a subroutine "Writing processing records" in Fig. 1.

Fig. 3 is a table showing the correspondences between image processing contents and code numbers representing them.

Fig. 4 is a diagram showing information embedded in image data - in this example, processing information, date information, and version information.

Fig. 5 is a table representing the image positions of pixels in which processing information is embedded.

Fig. 6 is a diagram for explaining an operation to set the least significant bit of pixel data to 0.

Fig. 7 is a diagram for explaining the principle to embed processing information in the least significant bit of pixel data, which was set to 0 in Fig. 6.

Fig. 8 is a table showing, with respect to an R plane, the positions of pixels to which processing

information is written in a second embodiment.

Fig. 9 is a table showing, with respect to a G plane. the positions of pixels to which processing information is written in a second embodiment.

Fig. 10 is a table showing, with respect to a B plane. the positions of pixels to which processing information is written in a second embodiment.

Fig. 11 is a table showing, with respect to an R plane. the positions of pixels to which processing information is written in a third embodiment.

Fig. 12 is a table showing, with respect to a G plane. the positions of pixels to which processing information is written in a third embodiment.

Fig. 13 is a table showing, with respect to a B plane. the positions of pixels to which processing information is written in a third embodiment.

Fig. 14 is a system diagram for explaining the outline of this invention.

Fig. 15 is a diagram showing an internal configuration of a computer.

Fig. 16 is a conceptual diagram showing the configuration of prior art image automatic correction software.

Fig. 17 is a diagram for explaining the flow of

operations of prior art software that edits and processes a full color image on a personal computer.

Fig. 18 is a diagram for explaining the flow of prior art software that processes a plurality of images at a time.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Fig. 14 is a system diagram for explaining the outline of this invention. To a computer 10, a display 11 is connected. Furthermore, a keyboard 12 and mouse 13 used for input are connected to the computer 10. The computer 10 has a front-mounted FD unit 107 for reading from and writing to a recording medium (flexible disk) 20. On the other hand, a printer for providing output from the computer 10 is connected via network N.

Fig. 15 is a block diagram showing an internal configuration of the computer.

In the interior of the computer 10, CPU 101, ROM 102, RAM 103, input-output port 104, keyboard 105, mouse 106, FD unit 107, and HD (hard disk) unit are connected via a bus 100.

The computer 10 singly or jointly executes a program stored in the ROM 102, and a program stored in the RAM 103, supplied from the flexible disk 20 or the

network N. Image data to be edited is stored in the RAM 103 or HD unit 108.

First embodiment

Fig. 1 is a flowchart for explaining the outline of this invention. This invention is provided with a subroutine "Writing processing records" as shown in the figure.

In this subroutine, necessary data is embedded in image data without substantially influencing the image. This method will be described later. The flowchart of Fig. 1 will be described.

This program, when started (step S1), in step S2, selects an image to be subjected to image processing. In step S3, the program edits and processes the selected image. The contents of the image processing vary depending on purposes. The program displays the processed image on a display unit (step S4), checks to see if it is as intended, proceeds to the subroutine "Writing processing records" (step S5), and writes a record of the contents of the performed image processing to image data. The program saves the image data to which processing contents are written (step S6), and terminates in step S7.

Fig. 2 is a subroutine flowchart showing the

contents of the subroutine "Writing processing records" (step S5).

The subroutine "Writing processing records", when started (step S11), transfers the contents of image memory to a work memory. The subroutine performs bit packing on write data in step S13. The bit packing is performed as described below.

The contents of image processing are assigned code numbers that can be represented in one byte, as shown in the table of Fig. 3. For example, if the contents of image processing are contrast correction by method 2, a code of 22 in hexadecimal notation is assigned.

Date is represented by elapsed time, in minutes, from 0:0 a.m., January 1, 1998. For this reason, 32 bits are used. Four-bit data is provided to check the version of processing history.

These information items are as shown in Fig. 4 when sequentially arranged. A is a portion indicating the contents of image processing, B is a portion indicating date, C is a portion indicating version check information, and b is a bit making up these items.

These bits are placed dispersively over the surface of an image subjected to image processing. The

positions in which they are placed are calculated in step S14.

An image used in this example is a full-color natural image the size of which is 1280 by 1024 pixels. The positions of the 44 bits in the image are decided. The bits are embedded as described below with respect to each of the R, G, and B planes of the image.

The image is divided by 8 both in the horizontal and vertical directions into 64 (8 × 8) units, values with a fractional portion truncated. The central pixel both in the horizontal and vertical directions of each unit is used to embed information, and bit positions are decided as shown in the table of Fig. 5.

In each position, the 44-bit information is embedded in the least significant bit (LSB) positions of intensity data of each pixel.

Since a pixel position in which each of the 44 bits is placed is decide in this way, the subroutine proceeds to step S15.

In this step, the pixel data at the each position of the image is modified as follows.

Data of each pixel, which is one byte, assumes any hexadecimal value from 00 to FF. As a result of the logical AND operation of the data with the hexadecimal

value FE, pixel data with only the least significant bit set to 0 is obtained (Fig. 6).

As a result of the logical OR operation of bits of the above packed data and pixel data with the least significant bit set to 0, pixel data with necessary data embedded will be obtained (Fig. 7).

The subroutine transfers the obtained data to the image memory (step S16) and exits in step S17.

Since processing information is written dispersively in this way and only the least significant bit of image data changes, there is no substantial reduction in image quality.

Second embodiment

In the above-mentioned embodiment (first embodiment), an image is manipulated in the same way for each plane of R, G, and B colors. Consequently, the processing information may be visible on faint images. In a second embodiment, this drawback is eliminated by making the processing information more inconspicuous.

Figs. 8, 9, and 10 are tables showing the positions of pixels to which processing information is written, with respect to R, G, and B planes.

As shown in the tables, the positions of pixels

in which processing information is embedded are reversely shifted five pixels relative to the R plane, in the case of the G and B planes.

By this arrangement, processing information is embedded more dispersively, making the existence of the processing information more inconspicuous.

Even in an image to which no processing information is written, pixel data at the above-mentioned positions may happen to be arranged meaningfully. At this time, the pixel data may be read mistakenly as information. In this embodiment, identical information is written to each of the R, G, and B planes. During reading of the information, by checking whether these information pieces match, such an accident can be eliminated.

Third embodiment

The second embodiment provides for the case where given information is visible as noise. However, since the 44 bits may accidentally form a meaningful data array, in the third embodiment, as shown in Figs. 11, 12, and 13, five bits are added as parity data to make 49-bit configuration.

Fourth embodiment

In the embodiments that have been heretofore described, the positions of pixels to embed processing information in are fixed. In this embodiment, several patterns of these positions are provided, and a pattern can be selected from these patterns so that influence on the image is minimized.

Although the least significant bit of image data is modified in the above-mentioned first to fourth embodiments, other than the least significant bit may be modified if the modification is inconspicuous. For example, if the range of intensity of image is wide (e.g., 16 bits), the second or third bit position from the least significant bit position may be modified. Also, if resolution is high, a higher bit position may be modified because modification of a single pixel is inconspicuous.

As seen in these embodiments, since information is embedded in image data itself, various information can be recorded regardless of the formats of image files.

Although only preferred embodiments are specifically illustrated and described herein, it will

be appreciated that many modifications and variations of the present invention are possible in light of the above teachings and within the purview of the appended claims without departing from the spirit and intended scope of the invention.

What is claimed is:

1. An image processing apparatus including:

a function to place bits for describing information different from information of image data obtained by image processing on original image data, respectively in specific bit positions of pixel data at predetermined positions of said processed image.

2. An image processing apparatus according to claim 1, wherein said pixels are dispersed at a plurality of predetermined positions on said image.

3. An image processing apparatus according to claim 1, wherein said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

4. An image processing apparatus according to claim 1, wherein said information different from information of said processed image data is information describing time when said image processing is performed on original image data to obtain said processed image data.

5. An image processing apparatus according to claim 1, wherein said information different from

information for describing said processed image data is information describing time when said bits are placed.

6. An image processing method comprising:

a first step to obtain first processed image data by performing image processing on original image data; and

a second step to place bits for describing information different from information of said first processed image data respectively in specific bit positions of pixel data at predetermined positions of said first processed image.

7. An image processing method according to claim 6, wherein said pixels are dispersed at a plurality of predetermined positions on said image.

8. An image processing method according to claim 6, wherein said information different from information of said first processed image data is information describing the contents of image processing performed on said original image data to obtain said first processed image data.

9. An image processing method according to claim 6, wherein said information different from information of said first processed image data is information describing time when said first step is

performed.

10. An image processing method according to claim 6, wherein said information different from information of said first processed image data is information describing time when said second step is performed.

11. A recording medium in which a program for a computer is stored, wherein said program is one that enables the computer to perform the following processing:

placing bits for describing information different from information of image data, said processed image data being obtained by image processing on original image data, respectively in specific bit positions of pixel data at predetermined positions of said processed image.

12. A recording medium according to claim 11, wherein said pixels are dispersed at a plurality of predetermined positions on said image.

13. A recording medium according to claim 11, wherein said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

14. A recording medium according to claim 11, wherein said information different from information of said processed image data is information describing time when said image processing is performed on original image data to obtain said processed image data.

15. A recording medium according to claim 11, wherein said information different from information of said processed image data is information describing time when said bits are placed.

16. Image data characterized by bits for describing information different from information of processed image data obtained by image processing on original image data, which are placed respectively in specific bit positions of pixel data at predetermined positions of said processed image.

17. Image data according to claim 16, wherein said pixels are dispersed at a plurality of predetermined positions on said image.

18. Image data according to claim 16, wherein said information different from information of said processed image data is information describing the contents of image processing performed on said original image data to obtain said processed image data.

19. Image data according to claim 16, wherein

said information different from information of said processed image data is information describing time when said image processing is performed on said original image data to obtain said processed image data.

20. Image data according to claim 16, wherein said information different from information of said processed image data is information describing time when said bits are placed.

ABSTRACT

Specific information such as the type of performed image processing, and date is disassembled to bits, and the resulting bits are placed, e.g., in the least significant bit positions of pixels within processed image data. By this arrangement, when image processing is performed on original image data, it can be determined from processed image data what processing was executed on the image data.

FIG. 1

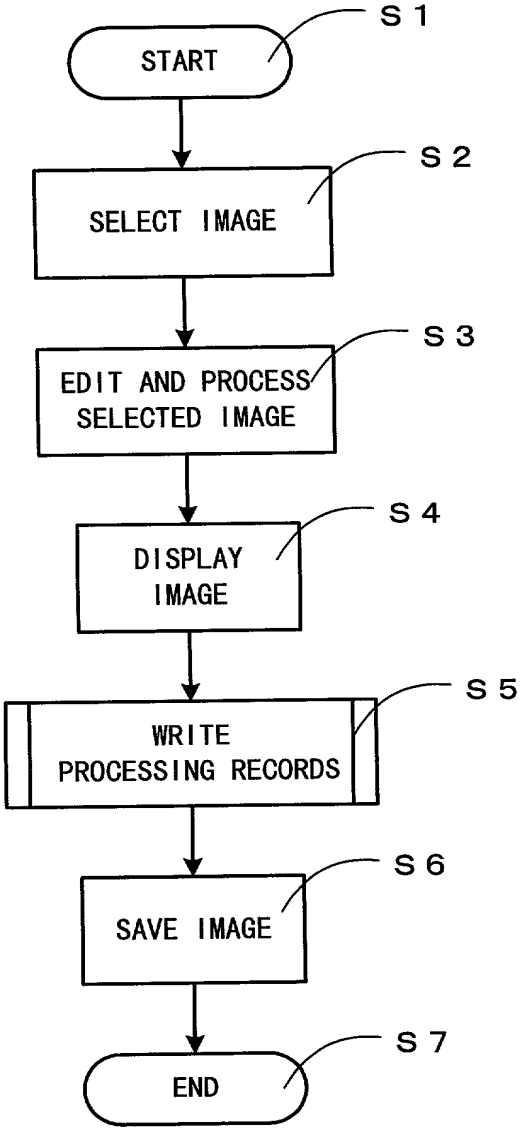

S 1
START
S 2
SELECT IMAGE
S 3
EDIT AND PROCESS SELECTED IMAGE
S 4
DISPLAY IMAGE
S 5
WRITE PROCESSING RECORDS
S 6
SAVE IMAGE
S 7
END

FIG. 2

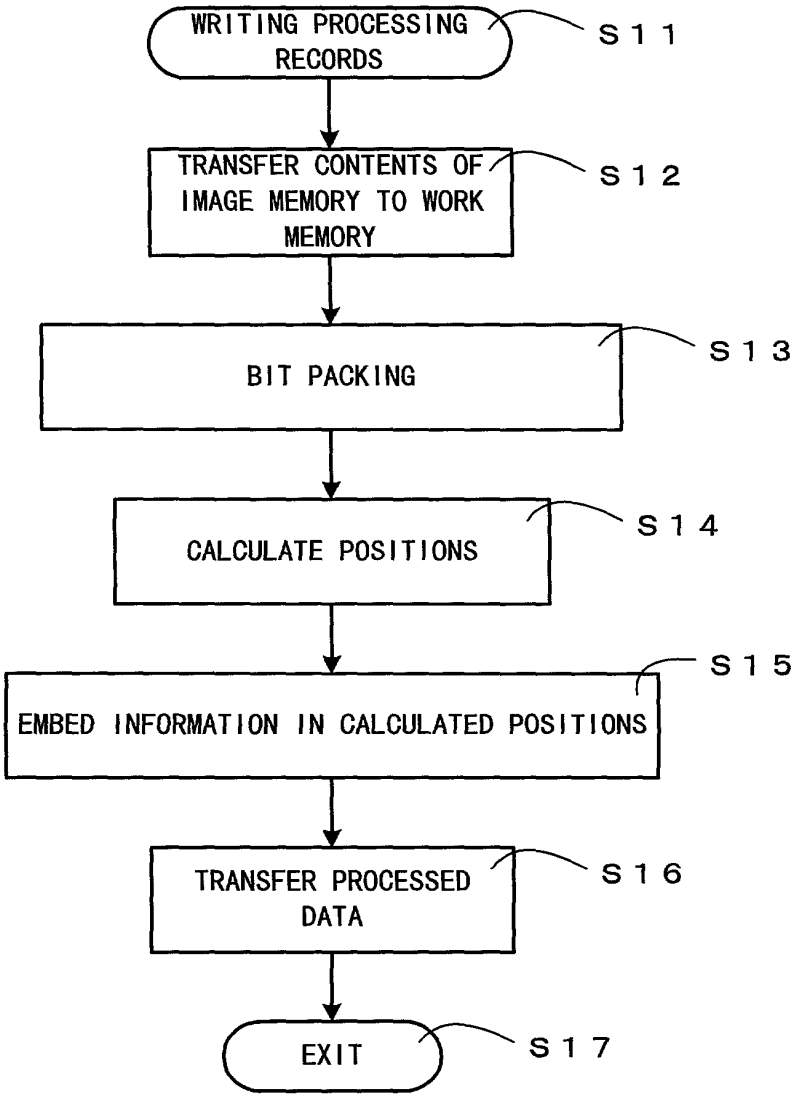

WRITING PROCESSING RECORDS
S11
TRANSFER CONTENTS OF IMAGE MEMORY TO WORK MEMORY
S12
BIT PACKING
S13
CALCULATE POSITIONS
S14
EMBED INFORMATION IN CALCULATED POSITIONS
S15
TRANSFER PROCESSED DATA
S16
EXIT
S17

FIG. 3

IMAGE PROCESSING	CODE
COLOR CORRECTION - METHOD 1	1 1
COLOR CORRECTION - METHOD 2	1 2
COLOR CORRECTION - METHOD 3	1 3
COLOR CORRECTION - METHOD 4	1 4
CONTRAST CORRECTION - METHOD 1	2 1
CONTRAST CORRECTION - METHOD 2	2 2
CONTRAST CORRECTION - METHOD 3	2 3
CONTRAST CORRECTION - METHOD 4	2 4
SHARPNESS CORRECTION METHOD - 1	3 1
SHARPNESS CORRECTION METHOD - 2	3 2
SHARPNESS CORRECTION METHOD - 3	3 3
SHARPNESS CORRECTION METHOD - 4	3 4

FIG. 4

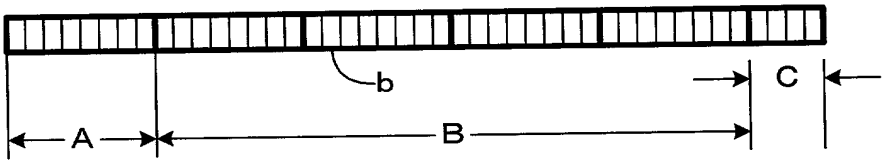


FIG. 5

BIT	UNIT (H , V)
1ST BIT	1ST , 1ST
2ND BIT	2ND , 1ST
⋮	⋮
44THD BIT	2ND , 7TH

FIG. 6

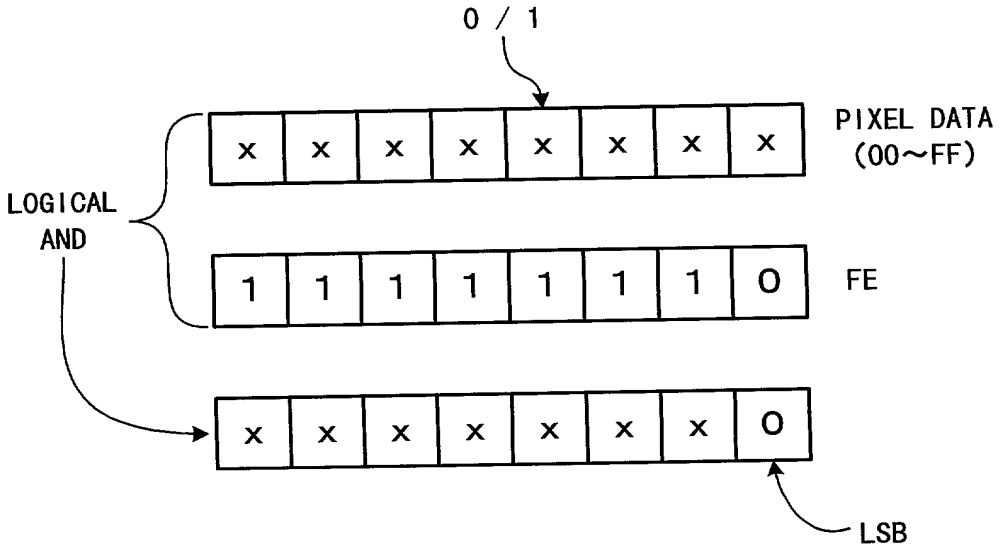

0 / 1
PIXEL DATA
(00~FF)
LOGICAL
AND
FE
LSB

FIG. 7

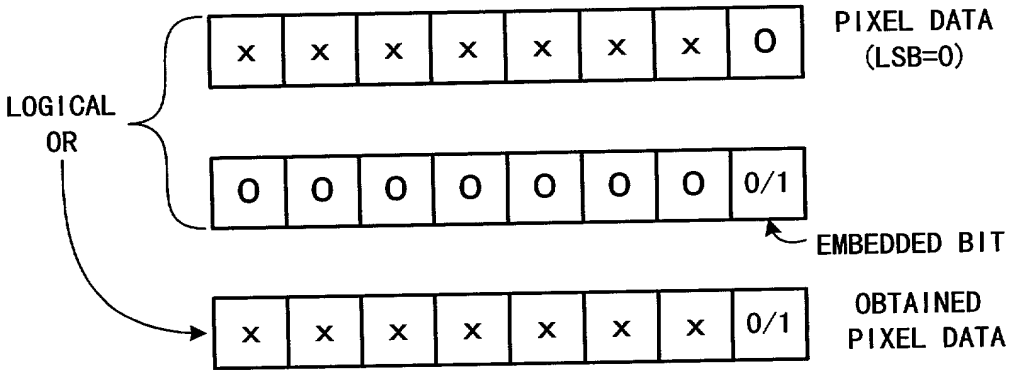

PIXEL DATA
(LSB=0)
LOGICAL
OR
EMBEDDED BIT
OBTAINED
PIXEL DATA

FIG. 8

R PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. , 1ST C.P.
2ND BIT	2ND C.P. , 1ST C.P.
⋮	⋮
44TH BIT	2ND C.P. , 7TH C.P.

FIG. 9

G PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. + 5 , 1ST C.P. + 5
2ND BIT	2ND C.P. + 5 , 1ST C.P. + 5
⋮	⋮
44TH BIT	2ND C..P. + 5 , 7TH C.P. + 5

FIG. 10

B PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. − 5 , 1ST C.P. − 5
2ND BIT	2ND C.P. − 5 , 1ST C.P. − 5
⋮	⋮
44TH BIT	2ND C..P. − 5 , 7TH C.P. − 5

FIG. 11

R PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. , 1ST C.P.
2ND BIT	2ND C.P. , 1ST C.P.
⋮	⋮
47TH BIT	5TH C.P. , 7TH C.P.
48TH BIT	6TH C.P. , 7TH C.P.
49TH BIT	7TH C.P. , 7TH C.P.

FIG. 12

G PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. + 5 , 1ST C.P. + 5
2ND BIT	2ND C.P. + 5 , 1ST C.P. + 5
⋮	⋮
47TH BIT	5TH C.P. + 5 , 7TH C.P. + 5
48TH BIT	6TH C.P. + 5 , 7TH C.P. + 5
49TH BIT	7TH C.P. + 5 , 7TH C.P. + 5

FIG. 13

B PLANE

BIT	UNIT (H , V)
1ST BIT	1ST C.P. − 5 , 1ST C.P. − 5
2ND BIT	2ND C.P. − 5 , 1ST C.P. − 5
⋮	⋮
47TH BIT	5TH C.P. − 5 , 7TH C.P. − 5
48TH BIT	6TH C.P. − 5 , 7TH C.P. − 5
49TH BIT	7TH C.P. − 5 , 7TH C.P . − 5

FIG. 14

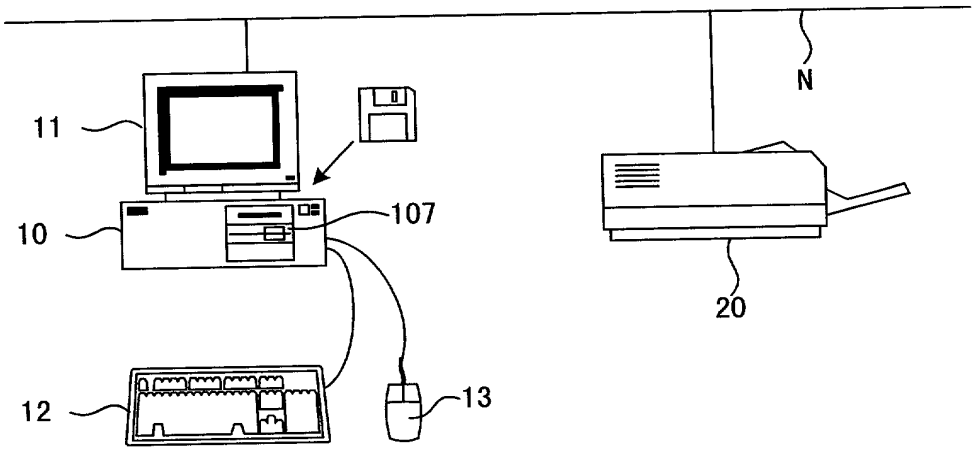

N
11
107
10
20
12
13

FIG. 15

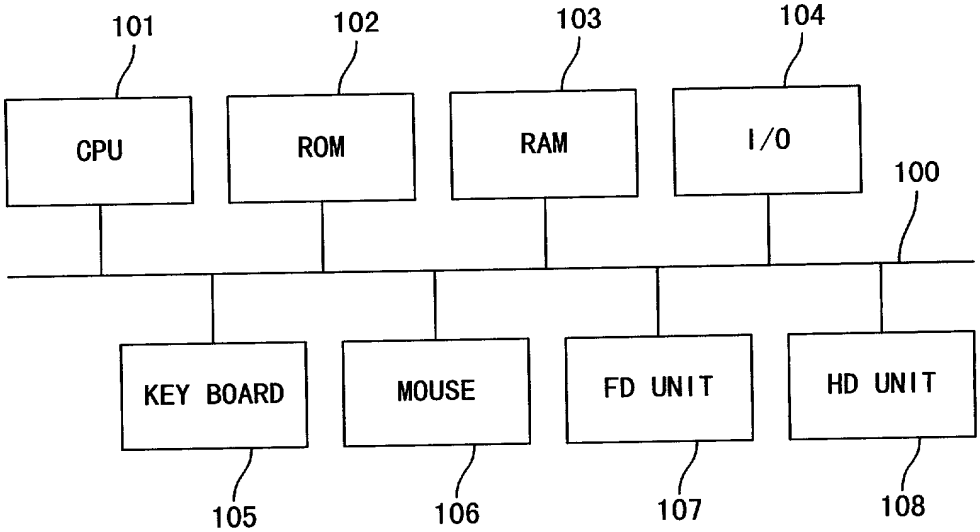

101
102
103
104
CPU
ROM
RAM
I/O
100
KEY BOARD
MOUSE
FD UNIT
HD UNIT
105
106
107
108

FIG. 16

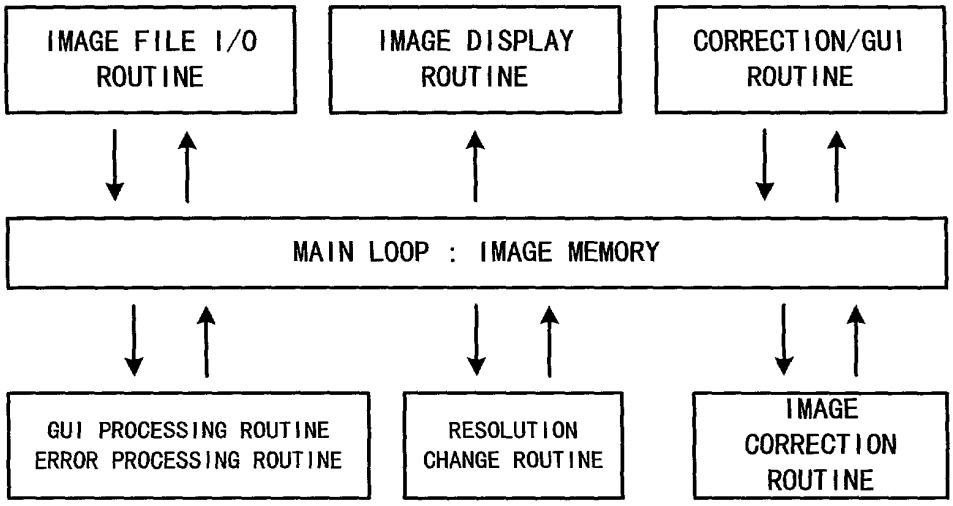


IMAGE FILE I/O ROUTINE
IMAGE DISPLAY ROUTINE
CORRECTION/GUI ROUTINE
MAIN LOOP : IMAGE MEMORY
GUI PROCESSING ROUTINE
ERROR PROCESSING ROUTINE
RESOLUTION CHANGE ROUTINE
IMAGE CORRECTION ROUTINE

FIG. 17

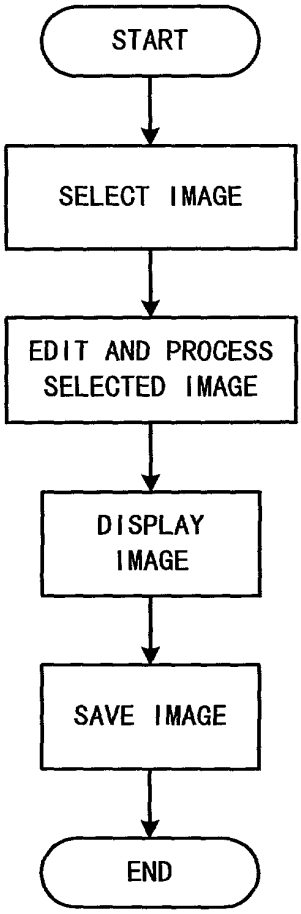
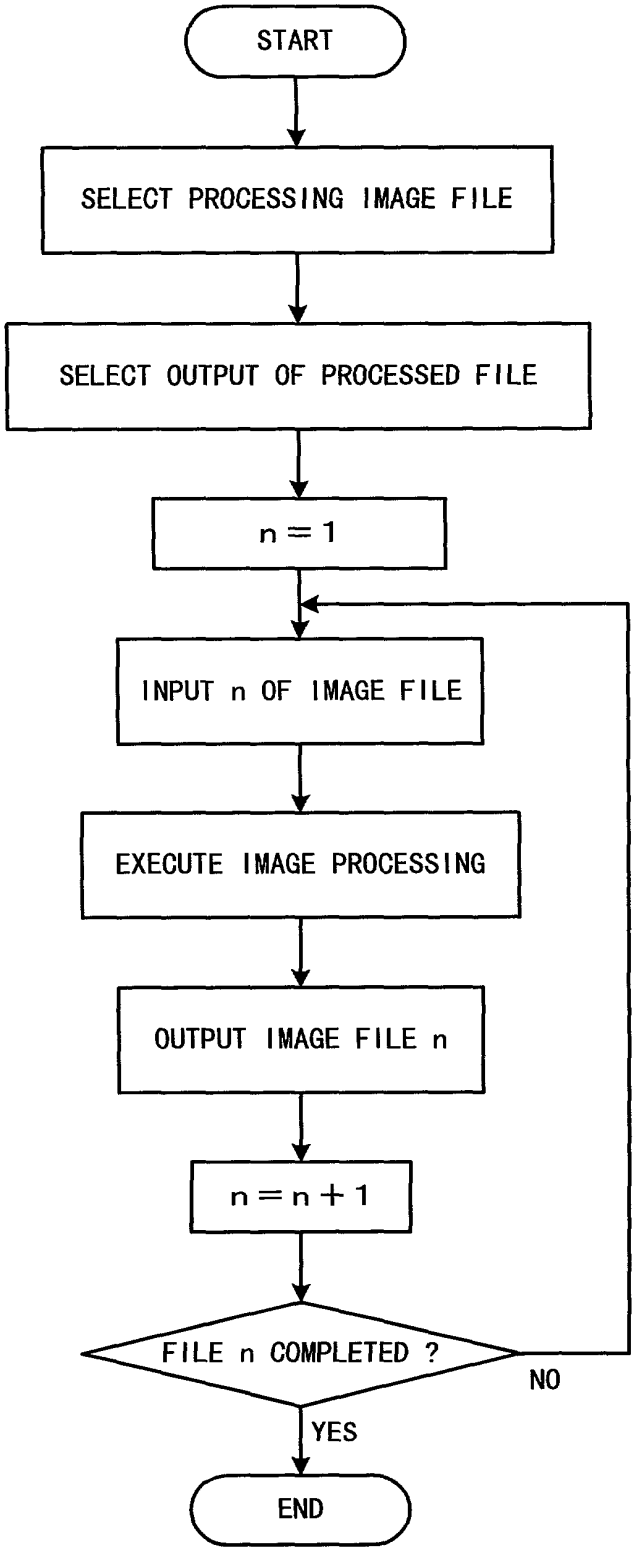

START
SELECT IMAGE
EDIT AND PROCESS SELECTED IMAGE
DISPLAY IMAGE
SAVE IMAGE
END

FIG. 18


START
SELECT PROCESSING IMAGE FILE
SELECT OUTPUT OF PROCESSED FILE
n = 1
INPUT n OF IMAGE FILE
EXECUTE IMAGE PROCESSING
OUTPUT IMAGE FILE n
n = n + 1
FILE n COMPLETED ?
NO
YES
END

PATENT
Docket No.

Client Ref.

COMBINED DECLARATION AND POWER OF ATTORNEY FOR UTILITY/DESIGN PATENT APPLICATION

AS A BELOW-NAMED INVENTOR, I HEREBY DECLARE THAT:

My residence, citizenship, and post office address are as stated below next to my name.

I believe I am the original, first and sole (or joint, if more than one name appears below) inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

DIGITAL IMAGE PROCESSING APPARATUS

the specification of which:

☒ is attached hereto.
☐ was filed on _____ as application serial No. _____ and was amended on _____ (if applicable).

I HAVE REVIEWED AND UNDERSTAND THE CONTENTS OF THE ABOVE-IDENTIFIED SPECIFICATION, INCLUDING THE CLAIMS, AS AMENDED BY ANY AMENDMENT REFERRED TO ABOVE.

I acknowledge and understand that I have a duty to disclose information which is material to the patentability of the claims of this application in accordance with Title 37, Code of Federal Reg.ulations, §§ 1.56(a) and (b).

I hereby claim foreign priority benefits under Title 35, United States Code § 119(a)-(d) of the foreign application(s) for patent indicated below and have also identified below the foreign applications for patent or inventor's certificate on this invention having a filing date before that of the application for patent or inventor's certificate on this invention having a filing date before that of the application on which priority is claimed:

Country/International	Application No.	Date of Filing (day/month/year)	Priority Claimed?
JAPAN	10-115868 Pat	13/APRIL/1998	☒Yes ☐No.
			☐Yes ☐No.
			☐Yes ☐No.
			☐Yes ☐No.
			☐Yes ☐No.

I hereby claim benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below:

Application Serial No.	Filing Date

I hereby claim benefit under Title 35, United States Code, § 120 of any United States application(s) listed below, and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §§ 1.56(a) and (b) set forth above which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application Serial No.	Filing Date	Status
		☐Patented ☐Pending ☐Abandoned
		☐Patented ☐Pending ☐Abandoned
		☐Patented ☐Pending ☐Abandoned

I hereby appoint the following attorneys and agents to prosecute that application and to transact all business in the Patent and Trademark Office connected therewith and to file, to prosecute and to transact all business in connection with all patent applications directed to the invention:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Mar. 25, 1999 — Kenji Masaki
Date

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